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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/058,708      | 01/28/2002  | Kay Hellig           | 1458.TT4978         | 7368             |

34456 7590 11/17/2006

LARSON NEWMAN ABEL POLANSKY & WHITE, LLP  
5914 WEST COURTYARD DRIVE  
SUITE 200  
AUSTIN, TX 78730

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| EXAMINER |
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WILCZEWSKI, MARY A

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| ART UNIT | PAPER NUMBER |
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2822

DATE MAILED: 11/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/058,708

Applicant(s)

HELLIG, KAY

Examiner

M. Wilczewski

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on February 28, and June 22, 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 18-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 33 is/are allowed.
- 6) ☒ Claim(s) 1, 18-32 and 34-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

This Office action is in response to the amendment filed on February 28, 2006, and the supplemental response filed on June 22, 2006.

#### ***Withdrawal of Allowability***

The indicated allowability of claims 1 and 18 is withdrawn in light of the amendments made to these claims in Applicant's amendment filed on February 28, 2006.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 25-28 and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 25 after "spacers" in line 2, ", said L-shaped spacers" should be deleted. Either a term must be inserted or "and" must be deleted from line 1 of claim 26 which presently reads "...wherein **said and** horizontal portion...". In line 2 of claim 26, "having" should be changed to either "has" or "have", depending on how line 1 is amended to correct the above-identified problem. In claim 40, line 2, "having" should be changed to "has".

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 18, 19-23, 25, 34-37, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pradeep et al., US Patent 6,251,764, of record.

Pradeep et al. disclose a method of fabricating L-shaped spacers without the use of a sacrificial forming spacer by forming a liner oxide layer 92 and a dielectric layer 100 comprising silicon nitride overlying a gate structure 88 and anisotropically etching the dielectric layer 100 to form an L-shaped spacer having vertical and horizontal portions varying in thickness, see figures 6-9 and column 3, lines 11-65, and column 4, lines 14-26. Pradeep et al. do not expressly disclose that the horizontal portion of the L-shaped spacer has a thickness that varies gradually to provide an average thickness that is 50 to 85 percent of a maximum thickness. However, the horizontal portion of the spacer of Pradeep shown in figure 9 has a thickness that varies gradually from a maximum thickness of about 200 to 1000 Å to a thickness of zero. The average thickness of the horizontal portion shown in figure 9 is approximately 50 percent of the maximum thickness. Moreover, Pradeep et al. clearly teach that the slope of the taper portion 110 can be altered by modifying the gas flow rates of the etching gases, see column 4, lines 14-26. Therefore, the average thickness of the taper portion would have been an obvious matter of design choice bounded by well known manufacturing constraints and

Art Unit: 2822

ascertainable by routine experimentation and optimization, since Applicant has not disclosed that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using other average thicknesses.

Claims 24 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pradeep et al., US Patent 6,251,764, as applied to claims 1 and 19 above, and further in view of Verma, US Patent 5,716,880, both of record.

Pradeep et al. is applied as above. Pradeep et al. lack anticipation of forming the dielectric spacer layer of silicon oxynitride. However, Verma discloses spacers being made from a variety of materials including silicon oxide, silicon nitride and silicon oxynitride (col. 9, lines 35-65). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to substitute silicon oxynitride for the silicon nitride dielectric spacer material used in the known method of Pradeep et al., since Verma teaches the functional equivalence of these materials in the fabrication of dielectric spacers.

Claims 27-31 and 41-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pradeep et al., US Patent 6,251,764, of record, as applied to claims 1, 19, 25, and 39 above, and further in view of Brooks et al., US Patent 5,786,276, newly cited.

Pradeep et al. is applied as above. Pradeep et al. do not specifically show etching the dielectric spacer layer with a chemistry comprising  $\text{CH}_3\text{F}$  and  $\text{O}_2$  in combination with an inert gas. Pradeep et al. teach forming the spacer by reactive ion etching with an etching chemistry comprising  $\text{Cl}_2$  and  $\text{O}_2$  in combination with an inert gas, such as He or Ar, see col. 3, lines 52-65. Brooks et al. disclose the selective plasma etching of silicon nitride over silicon oxide using a chemistry combination of  $\text{CH}_3\text{F}$  and  $\text{O}_2$  with an inert gas, see the Abstract, Tables 1A, 1B, and 1C, and column 7, lines 19-23. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use the etching chemistry of Brooks et al. in the known method of Pradeep et al., since the method of Pradeep et al. requires the selective etching of the silicon nitride dielectric spacer layer and the etching chemistry of Brooks et al. provides both high etch selectivity for silicon nitride and high nitride etch rates.

#### ***Allowable Subject Matter***

Claim 33 is allowable over the prior art of record.

Claims 26 and 40 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

### ***Response to Arguments***

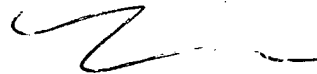
Applicant's arguments with respect to claims 1 and 18-45 have been fully considered but are not persuasive. Applicant has argued that the art of record relied upon by the Examiner does not disclose a horizontal portion of an L-shaped spacer having an average thickness that is 50 to 85 percent of the maximum thickness of the horizontal portion. However, as noted in the rejection above, it has been argued that the horizontal portion of the L-shaped spacer of Pradeep et al. has an average thickness of approximately 50 percent, as shown in figure 9. Moreover, Pradeep et al. disclose how to modify the slope of the horizontal portion. It has been further argued by the Examiner that the claimed average thickness is an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization, since Applicant has not disclosed that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using other average thicknesses.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Wilczewski whose telephone number is (571) 272-1849. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



M. Wilczewski  
Primary Examiner  
Tech Center 2800